HTTP://www.deltaww.com/acdrives

DeviceNet(DN-02) Instruction

Table of Content

Preface

DeviceNet (DN-02) is compatible with DELTA AC drives -- VFD series.
The model no.: DN-02M is compatible with DELTA VFD-M AC drives.
The model no.: DN-02B is compatible with DELTA VFD-B AC drives.
The model no.: DN-02S is compatible with DELTA VFD-S AC drives.
Ensure the DeviceNet and AC drives are compatible before using DN-02.

Overview

Dimension

DN-02

42.0 [1.65]

100.0 [3.94]

Network
Module
SP

ADD1
ADD2

Data Rate
500K
250K
125K

RS-485

107.0 [4.21]

92.0 [3.62]

34.0 [1.34]

58.0 [2.28]

67.9 [2.67]
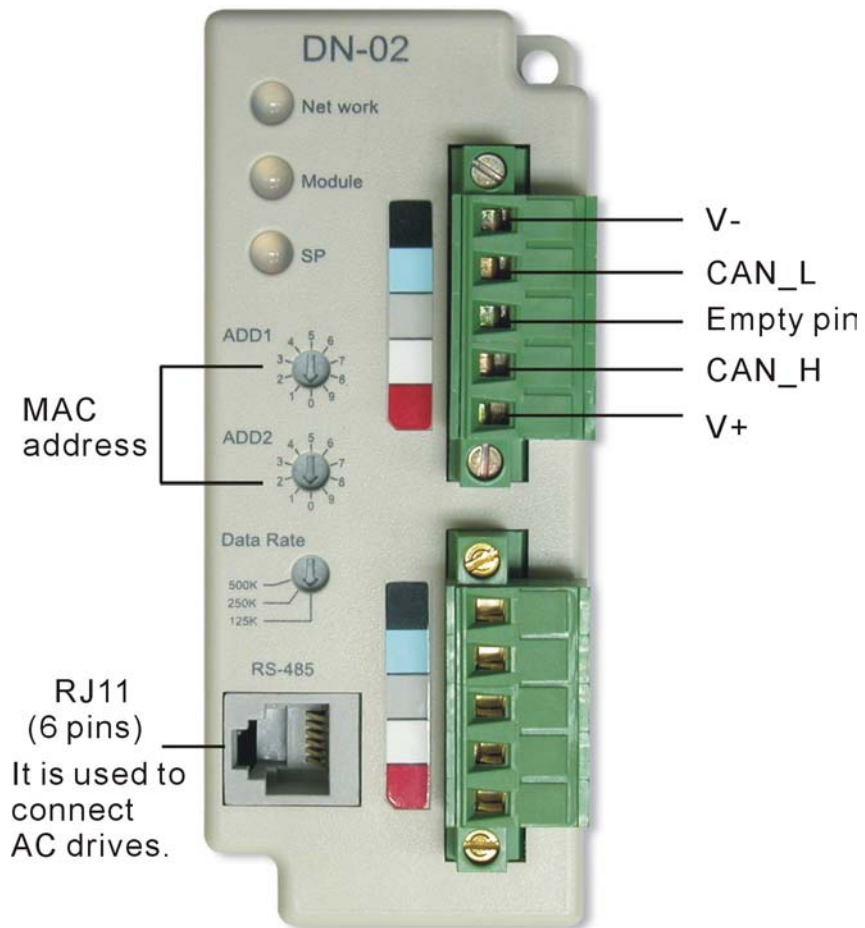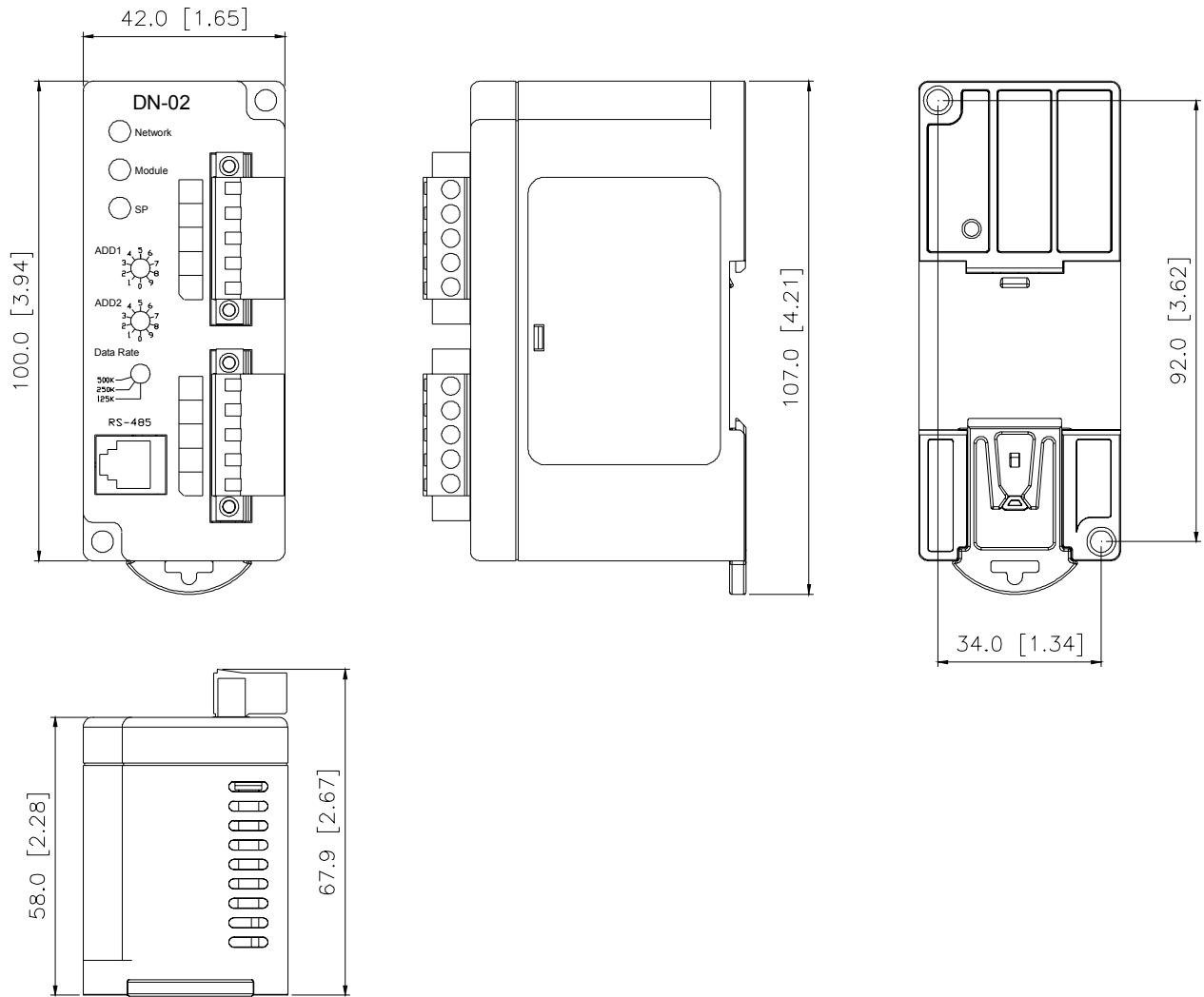
Quick Start

A. The settings for Installation

Step 1. Setting communication format of AC drives to 19200 RTU 8,N,2.

Step 2. Setting frequency source of AC drives to operate from RS485.

Step 3. Setting run/stop source of AC drives to operate from communication interface.

Note: you can refer to following chart for setting step 1, step 2 and step 3.

	M type	S type	B type
VFD_address	P88=1	P09-00=1	P09-00=1
Baud rate 19200	P89=2	P09-01=2	P09-01=2
RTU 8,n,2	P92=3	P09-04=3	P09-04=3
Freq. source	P00=3	P02-00=4	P02-00=4
Run/stop source	P01=4	P02-01=4	P02-01=4

Step 4. Using RJ11 (6 pins) to connect RS485 of DN-02 and AC drive.

Step 5. Adding the EDS files (saved in the disk) into DeviceNet management software.

Step 6. Using the operation method of DeviceNet management software for DN-02 connection.
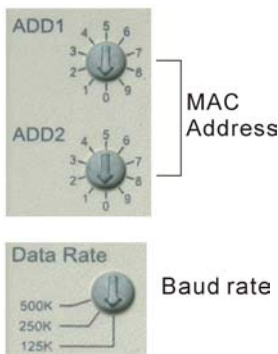
B. Switch and Baud rate setting

1. Set Baud rate

Switch value	0	1	2	Other
Baud Rate	125K	250K	500K	AUTO

2. Set MAC Address

Using decimal data set the MAC address,

Using switch

Example:
    Add1: 3
    Add2: 6
    Data rate: 250k
    Then the value of MAC ID is 36, not 0x36;
    The Baud rate is 250K;

If data rate is large than 500k, DN-02 will auto tuning the baud rate of DeviceNet at power on. If address setting as 99 will RS 485 can setting data configuration 0x7100~0x710A or class 95 data configuration. If address setting is greater than 63 and not 99, DN-02 will set the MAC ID to the DeviceNet default ID 63 automatically.

C. The default settings of I/O poll message 4 bytes input 4 bytes output data
The following information is for DELTA VFD-M. Please refer to communication information in your user manual of AC drives for detail.

■ I/O poll message
The information in the following tables
1. Input data from AC drives to DeviceNet

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	LED Status ex: VFD-M is 2101H							
1	Command Control status ex: VFD-M is 2101H							
2	Frequency command (Low Byte) ex: VFD-M is 2102H							
3	Frequency command (High Byte) ex: VFD-M is 2102H							

2. Output data from DeviceNet to AC drives

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Operate Command (Low Byte) ex: VFD-M is 2000H							
1	Operate Command (High Byte) ex: VFD-M is 2000H							
2	Speed Reference (Low Byte) ex: VFD-M is 2001H							
3	Speed Reference (High Byte) ex: VFD-M is 2001H							

Note : If your DN-02 has not been set before, you can use it by connecting with DeviceNet network without any settings. At this time, DN-02 provides a default I/O setting as above table. When power on, DN-02 uses this default setting to exchange data with network in I/O message. If you need to configure the I/O setting, please refer to next page.

Configure the DN-02 According to Your Requirements

The following communication information is for DELTA VFD-M. Please refer to communication information in your user manual of AC drive for detail.

■ **Configure the DN-02 by DeviceNet**

DN-02 supports a Object called DataConf (0X95), you can access this object by DeviceNet configuration or management tools. The DataConf Object is defined as follows:

Class 0x95   DataConfigure

Class Attributes

Attribute ID	Access Rule	Name	Data Type
1	Get	Revision	UINT

Instance 1:

Attribute ID	Access Rule	Name	Data Type	Modbus Address	Description
1	Get/Set	dlen_in	USINT	7100H	Length of input data
2	Get/Set	dlen_out	USINT	7100L	Length of output data
3	Get/Set	out_state	USINT	7101	0: output address not continued 1: output address continued
4	Get/Set	data_in1	UINT	7102	1st word input data
5	Get/Set	data_in2	UINT	7103	2nd word input data
6	Get/Set	data_in3	UINT	7104	3rd word input data
7	Get/Set	data_in4	UINT	7105	4th word input data
8	Get/Set	data_out1	UINT	7106	1st word output data
9	Get/Set	data_out2	UINT	7107	2nd word output data
10	Get/Set	data_out3	UINT	7108	3rd word output data
11	Get/Set	data_out4	UINT	7109	4th word output data
12	Get/Set	config_flag	USINT	710A	0: DN-02 will use this object for I/O message other: DN-02 use default setting.

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0X05	Yes	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Note: You can set this object for your application. When you finished this setting, you must be set the instance 1 attribute 12 (config_flag) to 0. Otherwise, DN-02 will still use default setting in I/O data exchange.

■ **Configure the DN-02 by Delta Modbus**

DN-02 still support Delta Modbus protocol. You may configure it by Delta Modbus protocol. Modbus address assigned table is in above table. You may refer the AC Driver manual for using Delta Modbus.

When you use Delta Modbus protocol to configure the DN-02, you must set the MAC ID switch to 99 before power on to enter configure mode. If DN-02 enters configure mode, all LED will be orange lamp and you can access address 0x7100-0x710A to configure DataConf Object.

■ **An Example for DataConf Object**

If we had finished setting as follows:

Attribute ID	485 address	Name	Value (Hex)	Description
1	7100H	dlen_in	6	Set input data is 6 bytes
2	7100L	dlen_out	8	Set output data is 8 bytes
3	7101	out_state	0	Output data address is not continued
4	7102	data_in1	2000	Operate command
5	7103	data_in2	2001	Speed reference
6	7104	data_in3	2002	Bit 0: it means EF (external fault) on when bit 0 is 1. Bit 1: it means Reset when bit 1 is 1.
7	7105	data_in4	0	Not care
8	7106	data_out1	2101H	Get LED status and command control status
9	7107	data_out2	2103H	Get Actual speed
10	7108	data_out3	2104H	Get output current
11	7109	data_out4	010AH	Get value of parameter 010A
12	710A	config_flag	0	Clear this value to use this setting

We have a data list according to above setting:

1. Input data from AC drives to DN-02

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	LED Status							
1	Command Control status							
2	Speed Actual(Low Byte)							
3	Speed Actual(High Byte)							
4	Output current (low byte)							
5	Output current (high byte)							
6	Value of parameter 010A (low byte)							
7	Value of parameter 010A (high byte)							

2. Output data from DN-02 to AC drives

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Operate Command (Low Byte)							
1	Operate Command (High Byte)							
2	Speed Reference (Low Byte)							
3	Speed Reference (High Byte)							
4	Bit 0: it means EF (external fault) on when bit 0 is 1. Bit 1: it means Reset when bit 1 is 1.							
5	Reserved							
6	Not care							
7	Not care							

DeviceNet Objects

■ Object Classes

Class	Object
0x01	Identity
0x02	Message router
0x03	DeviceNet
0x05	Connection
0x0f	Parameter
0x95	DataConf

1. Class 0x01   Identity
   Class Attributes

Attribute ID	Access Rule	Name	Data Type
1	Get	Revision	UINT
2	Get	MaxInstance	UINT
3	Get	NumberofInstances	UINT
6	Get	MaxIdClass	UINT
7	Get	MaxIdInstance	UINT

Instance 1 :Drive Instance

Attribute ID	Access Rule	Name	Data Type
1	Get	VendorId	UINT
2	Get	DeviceType	UINT
3	Get	ProductCode	UINT
4	Get	Revision	
		MajRev	USINT
		MinRev	USINT
5	Get	Status	WORD
6	Get	Sn	UDINT
7	Get	ProdName	
		StrLen	USINT
		ASCIIStr	STRING

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x05	No	Yes	Reset
0x0e	Yes	Yes	Get_Attribute_Single
0x10	Yes	No	Find_Next_Object_Instance

2. Class 0x02   Message router
   Class attributes

Attribute ID	Access Rule	Name	Data Type
1	Get	Revision	UINT
6	Get	MaxIdClass	UINT
7	Get	MaxIdInstance	UINT

Instance 1 :

Attribute ID	Access Rule	Name	Data Type
2	Get	NumAvailable	UINT
3	Get	NumActive	UINT

Common Services

| Service Code | Implemented for | | Service Name |
	Class	Instance	
0x0e	Yes	Yes	Get_Attribute_Single

3. Class 0x03   DeviceNet
   Class Attributes

Attribute ID	Access Rule	Name	Data Type
1	Get	Revision	UINT

Instance 1 :Drive Instance

Attribute ID	Access Rule	Name	Data Type
1	Get	MACID	USINT
2	Get	BaudRate	USINT
3	Get/Set	BusofInterrupt	BOOL
4	Get/Set	BusofCounter	USINT
5	Get	AllocationInfo AllocationChioce MasterNodeAddress	BYTE USINT
6	Get	MACIDSwitchChanged	BOOL
7	Get	BaudRateSwitchChanged	BOOL
8	Get	MACIDSwitchValue	USINT
9	Get	BaudRateSwitchValue	USINT

Common Services

| Service Code | Implemented for | | Service Name |
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x4B	No	Yes	Allocate_Master/Slave_Connection_Set
0x4C	No	Yes	Release_Master/Slave_Connection_Set

4. Class 0x05　Connection
Class attributes

Attribute ID	Access Rule	Name	Data Type
1	Get	Revision	UINT

Instance 1 :Master/Slave Explicit Message Connection

Attribute ID	Access Rule	Name	Data Type
1	Get	State	USINT
2	Get	InstanceType	USINT
3	Get	TransportClassTrigger	USINT
4	Get	ProducedConnectionId	UINT
5	Get	ConsumedConnectionId	UINT
6	Get	InitialCommCharacteristics	BYTE
7	Get	ProducedConnectionSize	UINT
8	Get	ConsumedConnectionSize	UINT
9	Get/Set	ExpectedPackedRate	UINT
12	Get/Set	WatchdogTimeoutAction	USINT
13	Get	Produced Connection Path Length	USINT
14	Get	Produced Connection Path	EPATH
15	Get	Consumed Connection Path Length	USINT
16	Get	Consumed Connection Path	EPATH

Instance 2 :Polled I/O Connection

Attribute ID	Access Rule	Name	Data Type
1	Get	State	USINT
2	Get	InstanceType	USINT
3	Get	TransportClassTrigger	USINT
4	Get	ProducedConnectionId	UINT
5	Get	ConsumedConnectionId	UINT
6	Get	InitialCommCharacteristics	BYTE
7	Get	ProducedConnectionSize	UINT
8	Get	ConsumedConnectionSize	UINT
9	Get/Set	ExpectedPackedRate	UINT
12	Get/Set	WatchdogTimeoutAction	USINT
13	Get	Produced Connection Path Length	USINT
14	Get	Produced Connection Path	EPATH
15	Get	Consumed Connection Path Length	USINT
16	Get	Consumed Connection Path	EPATH

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x05	No	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

5. Class 0x0f   Parameter

Class attributes

Attribute ID	Access Rule	Name	Data Type
1	Get	Revision	UINT
2	Get	MaxInstance	UINT
8	Get	ParaClassDescriptor	WORD
9	Get	ConfAssemblyInst	UINT
10	Get	NativeLanguage	USINT

Instance 1 :Paremeter Instance 1 through 114

Attribute ID	Access Rule	Name	Data Type
1	Get/Set	Parameter Value	—
2	Get	Link Path Size	USINT
3	Get	Link Path	—
4	Get	Descriptor	WORD
5	Get	Data Type	USINT
6	Get	Data Size	USINT

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0X05	Yes	No	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

6. Class 0x95   DataConf

Class attributes

Attribute ID	Access Rule	Name	Data Type
1	Get	Revision	UINT

Instance 1:

Attribute ID	Access Rule	Name	Data Type
1	Get/Set	dlen_in	USINT
2	Get/Set	dlen_out	USINT
3	Get/Set	out_state	USINT
4	Get/Set	data_in1	UINT
5	Get/Set	data_in2	UINT
6	Get/Set	data_in3	UINT
7	Get/Set	data_in4	UINT
8	Get/Set	data_out1	UINT
9	Get/Set	data_out2	UINT
10	Get/Set	data_out3	UINT
11	Get/Set	data_out4	UINT
12	Get/Set	config_flag	USINT

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0X05	Yes	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Troubleshooting

Network LED:

State	Indication	Corrective Actions
LED is off	No power/duplicate ID not completed.	1. Verify that the power supply of DN-02 is connected and that power is reaching the DN-02 through the connector. 2. Make sure one or more nodes are communicating on the network. 3. Make sure at least one other node on the network is operational at the same time and data rate as the DN-02.
Flashing Green LED	Online/not connected.	
Green LED	Online/connected. One or more connections established	
Flashing Red LED	Online/Time-out. I/O connection timed out.	
Red LED	Network failure. Failed duplicate ID or Bus-off.	1. Ensure that all nodes have unique address. 2. If all node addresses are unique, check network for correct media installation.

Module LED:

State	Indication	Corrective Actions
LED is off	No power/not online	Ensure that the connected AC drive is powered and connected to the DN-02.
Flashing Green LED	Waiting for I/O data. No I/O, or PLC in program	DN-02 has passed all operational tests and is waiting to pass I/O data between the DN-02 and AC drives.
Green LED	I/O operational	
Flashing Red LED	Configuration problem. Bad CRC of DN-02 parameters or flash program.	Reset internal I/O data of DN-02. Please refer to Data Configuration address assign for detail.
Red LED	Hardware Failure. Failed internal or external RAM test.	Return to the factory.

SP LED:

State	Indication	Corrective Actions
LED is off	No power	There is no power applied to the device.
Flashing Green LED	DN-02 is reading the default settings of AC drives.	
Green LED	DN-02 and AC drives is communicating normally.	
Flashing Red LED	CRC check faulted.	To check if the setting of communication format of AC drives is correct. Please refer to the installation for detail.
Red LED	Connection failure/no connection	1. To check if the connection between AC drive and DN-02 RS485 is correct. 2. Re-wire the AC drive connection and ensure that the wire specification is correct.